pean glycerine mount is better than that in Canada balsam, which we more commonly use. There is a greater sharpness of outline given to the object. Among the instruments we miss from the German Laboratories is the polarizer as a common microscopic adjunct. For the study of starch and for tracing the laticiferous vessels in many cases, it is of the most essential service. The Jackson eye piece micrometer gives way to the simple round disk in the eye-piece and for all practical purposes is quite as good and much less expensive. It is fair to say that, among lower plants, the same reliance we place upon *exact* spore measurements is not found; the evidence based upon them being considered as confirmatory rather than conclusive; and probably with good reason. During the short winter days a large portion of the work done is by the aid of well shaded gas light, the intensity of which is more or less modified by colored chimneys; the flame being round and steady from the Argand burner. All theory aside, I cannot see but that it was as good as that from the coal oil which we insist upon as being essential.—J. T. ROTHROCK.

**Some New Mexican Ferns.** I.—In order that we should gain a correct knowledge of the flora of any section, some knowledge of its soil and climate is essential; a proposition which would seem to apply specially to the ferns.

The whole of New Mexico is a table-land, with superimposed mountains. The country along the rivers is usually very sandy, as are some of the plains between the mountain ridges. Others of these plains are gravelly, while others consist of a fine, deep soil, which, however, is always mixed, more or less, with gravel. So far as my observation goes, no ferns whatever grow in any of these localities. They are to be found only in the mountains. I have not found one fern growing on level ground, or in sandy or alluvial soil. Under these circumstances, we should expect to find the general character of the ferns very different from that of our eastern species. The difference is allowed to become still greater by the great difference in climate. Here, when it rains, it does little else, and when it dries, everything dries, and keeps on drying until it begins to rain again. Not having been here in the spring, I have been unable to gain any exact information as to the extent to which the ferns develop at that season. The most that I have been able to learn is that when there is an abundance of rain or snow during the winter and spring, the ferns spring up. Certain it is, that before the beginning of the rainy season in July, they are all as dry, and apparently dead, as though there had been no period of spring growth. Within a month after the beginning of the rains, they have made a good start, and within another month, the most of them have shown considerable fruit. A few, however, do not mature their spores until late in the fall, appearing to banter Old Winter with the challenge, "Catch me if you can!" These conditions combine to strip the ferns of that freshness and delicacy, or, I may say, that *crisp fragility*, which characterize our eastern species. Those which are not hairy or scaly are thickish and glaucous. The only eastern species that I can now recall as likely to give one an idea of the *tout ensemble* of these species is *Cheilanthes vestita*, Swz., or, to a

slight extent, *Aspidium aculeatum*, Swz , var. *Braunii*. The only one that I have found here to remind me in any way of those at home is a new variety of *Woodsia Oregana*, D. C. Eaton. These species are also peculiar in their dwarf habit. The majority of them never reach a height of one foot, while the extreme height of the two largest species is about two feet.

The whole number of species which I have found here is fourteen, all having been collected in Grant county. Beginning with *Cheilanthes*, I find six species, one of them, *referring to the segments*, smooth, two scaly, one hairy, and two both scaly and hairy. The smooth species is *C. Wrightii*, Hooker, which I have found in very small quantity, in a single locality, in two dense patches. This is on the sloping side of a very high mountain (a little over 7,000 feet), exposed to the very brightest sunshine, and rooting in partially decomposed, shelly sandstone. It is the smallest of my ferns, being but three or four inches in height, and very pretty. It is thickish, and almost coriaceous. The most beautiful portion of this fern is it stalk, which is of a very rare color, — a sort of a deep, shining bronze-brown. A dense cluster of these stalks looks brilliant in the sunshine. The lower part of the stalk is chaffy. This fern fruits during the middle of the season, that is during October.

*Cheilanthes lanuginosa*, Nutt., growing in the Northern Central States, is probably well known to most of you. It is very pretty here, growing in dense, though small tufts, in little hollows and crevices of perpendicular rocks, where there seems to be no soil whatever, and always on the north side, where no sun can ever reach it. It is one of the earliest ferns to fruit.

*Cheilanthes Eatoni*, Baker, the commonest and most abundant species, is one of the most beautiful. The largest specimens reach a height of a foot, and the fronds are so abundantly clothed with tomentum as to present a silvery white appearance. The mid rib only is scaly, so that when held to the light there is nothing to obscure the view of the minute and delicate segments, surrounded with their circles of silvery hairs Happy Mr. Eaton, to have his name associated with so beautiful a fern, and happy fern to be so connected with such a botanist! It grows everywhere among rocks, flourishing best in moderate shade.

*Cheilanthes Fendleri*, Hooker, is the scaly species. When first found, my companion named it "The Hard Green Fern," from the compact and bright-green appearance of the fronds. It grows in large but not dense patches, on hillsides, in gravel and in moderately shady situations. So slight is its articulation that is difficult to remove the dirt from specimens without knocking off all the fronds The color of the scales is said to be "white, changing to brown." I would add that when mature they again fade to a white ; but it is a grayish-white, easily distinguished from the almost pure white of those on young fronds. It fruits in November being one of the latest species.

Two interesting species I find which I think are *C. myriophylla*, Desvaux, and *C. Lindheimeri*, Hooker. The former I have found within a day or two, but in such an aged state that even the determination is doubtful. I do not know its time of fruiting.

*C. Lindheimeri* presents a very striking appearance, which is not easily mistaken or forgotten. It is best described by my companion's homely name of "The Flat White Fern." The upper surface is very white, very flat, and very compact as to the arrangement of the segments. The under surface is at first whitish, changing to a rusty brown, and later, to a silver gray. Its habit of growth is as peculiar as its appearance. It flourishes in shade or in sunshine, but best in moderate sunshine, and does not grow at all in constant shade. Wherever a mass of great jagged rocks is observed, there this fern may be looked for with an almost certainty of finding it. It always grows in the dirt which has lodged in the crevices of rocks, and these crevices it completely fills, so that a hook being inserted in the upper end of the crevice, a rope or strip of ferns, sometimes yards in length, may be torn up. As it is very late in fruiting, many fronds being without fruit as late as December, it has occurred to me that it selects these situations for the sake of the heat afforded during the night by the adjacent rocks. This may be called "The Sensitive *Cheilanthes*", as the pinnæ curl almost as soon as the plant is removed from the soil. Having removed even as few as ten specimens, it is difficult to press them in time to save them all.

Three *Pellæas* have been found, the first being our old friend, *P. atropurpurea*, Link, which grows near the bottoms of canons, in very shady positions, and which reaches its greatest perfection late in the fall, after the cold weather has begun. At this season I have found specimens more than twenty inches in height, and really stately in their beauty. It always selects a deep, rich soil. It fruits moderately early.

*Pellæa Wrightiana*, Hooker, is very different from the former species, very striking in its appearance, and very beautiful. I have found only a few exceeding ten inches in height. Half of this length is occupied by the dark brown, almost black stalk, which contrasts beautifully with the vivid bluish green, smooth fronds. The thick segments, before becoming recurved in fruit, are roundish, of the size of the head of a large tack, and tipped with a whitish, subulate point. They are arranged with great regularity. As the plant grows in the densest tufts, these segments are always hooked together in so intricate a manner that it is quite a task to separate them, and the fronds being very brittle, this is one of the most difficult ferns to collect in good specimens. It is always found on rocky hillsides, under the edges or in the crevices of rocks where there is but little earth, and where it can enjoy bright sunshine for a part of the day. It fruits during October.

*Pellæa andromedæfolia*, Fee, var. *pubescens*, is the only species except a *Notholæna*, which attains a height of two feet. The *Notholæna*, being very narrow, leaves this *Pellæa* the largest fern of this section. It is very scarce, being found in only a few localities, and there sparingly, so that I have been unable to secure enough specimens to supply all my sets. Notwithstanding its large size, it is very light and graceful in appearance, the segments being quite widely separated. These are roundish oblong, about one half an inch in length, of a light

glaucous green above, and a reddish glaucous green below. The stalks are reddish. It is invariably found in the deepest shade of underbrush, and usually growing up through dead brush. As it is exceedingly brittle, a strong puff of wind being sufficient to break off the tips when entangled, this habit of growing in brush makes it exceedingly difficult to secure entire specimens. I have been unable to secure more than one frond out of three in a presentable condition. It fruits during the middle of October, the fruit forming a deep black margin to the lightish colored segments.—HENRY H. RUSBY.

**On the Colors of some Western Flowers.**—There are a good many mistakes about them in the books *Cordylanthus Wrightii*, Gray, for example, is everywhere described as having a purplish corolla, whereas it is of a fine, light-sulphur yellow, which stands in showy contrast with the commonly rich, dark purple calyx which half encloses it.

*Orthocarpus purpureo albus*, Gray, is said to have corollas "purple and often partly white;" the truth being that they are always clear white on opening, and that after the first day they change to rose-purple.

In the January GAZETTE under *Ribes pinetorum*, Greene, I said that the flowers of *R. leptanthum*, Gray, are "white, not yellow, as said by Mr. Watson in Bot. King." But Mr. Watson writes to me that he has seen acres of it with yellow flowers. Now though the species occurs plentifully west of the Rocky Mountains I do not happen to have met with it but in Colorado and New Mexico, the locality whence it was first obtained, and I have never seen it but with white flowers, though there is usually a tip, or marking of decided green. The dubious var. *brachyanthum*, Gray, of California shows a tinge of purple. Will not our botanists in different parts of our western field take notice. the coming season, and all tell us through the GAZETTE what they find to be the color of flowers in *R. leptanthum?* Of course they may vary in different localities, but if this be the case, it should be established clearly.—EDWARD LEE GREENE.

**Carnivorous Plants. IV.**—EXPERIMENT No. IX.—Placed upon the center of the disk of a very vigorous and large leaf a small crumb of bread made from wheat flour, at 2:45 P. M., June 11, '79.

30 min. a few of the submarginal tentacles had bent slightly.

90 " " these tentacles were standing about at right angles with the plane of the surface of the blade of the leaf.

3 hrs. many of the marginal tentacles had moved some.

7 " a few of the submarginal tentacles were so inflected as to touch the specimen; also the marginal were much inflected.

10 " but little changed from the last note.

17 " all of the submarginal, marginal and outer disk tentacles had inflected to such a degree that nearly all of them touched the specimen; the edges of the leaf were also incurved greatly.

24 " leaf completely closed; substance of the bread soft and pulpy.